CZECH Chemical and Pharmaceutical Industry
Supplement of Czech Business and Trade
We come across chemical products in every aspect of our lives. This branch is truly a key segment of the Czech manufacturing industry. The year 2005 was favourable for the Czech chemical and pharmaceutical industry. In comparison with previous years, revenue from the sale of the industries’ own products and services (in constant prices) increased by more than 13 %. The figure showing labour productivity from book added value rose by nearly 7 % year-on-year, while the number of employees increased by only 1.3 %.

Exports and Imports
This branch also did well in terms of trade exchange. Exports of chemical products in 2005 rose by 21.5 % in comparison with the previous year and for the first time in the history of the Czech Republic exceeded the EUR 3.5 billion mark. Imports rose by 12.3 % to EUR 6.4 billion, somewhat less; nonetheless, the impact of exchange rates resulted in a slight deepening of the branch’s trade deficit, by approx. EUR 55 million on a year-on-year basis. The Czech Republic's joining the EU caused no serious problems in the chemical industry; on the contrary, it enabled this country to increase its trade exchange with the EU25. For illustration: in 2005 the EU25 accounted for more than 78 % of the CR's chemical exports and for more than 80 % of its imports.

Investment in the Chemical Industry
The chemical industry is one of the most demanding branches in terms of capital investment, and in view of its complicated production processes and technologies, it requires a highly skilled workforce and considerable investment in research and development. The annual volume of gross investment in recent years ranges around EUR 300-330 million, which shows a rate of investment in the CR much lower than that common in other developed western countries. In the CR investment amounts to just 1 %, while in the old EU states this figure ranges between 3 and 4 %. The largest investment projects completed in the CR in the past two years include two new modern plants of Spolchemie: one for the production of low-molecular resins and the other for the production of non-saturated polyester and alkyd resins, all of the highest world standard. Another important project is the intensification of aniline production in BorsodChem – MCHZ, which ranks the CR...
among the world’s leading manufacturers of this important commodity. Moreover, the sale of the licence for this production by BC-MCHZ to Japan is considered a great success.

**Future Development of the Branch**

The development of the main industrial indicators of the branch in 2006 shows that the growth rate will not be as high as in the previous two years. This is not only attributable to the high prices of crude oil, oil products and energy, but also to the slower growth of demand in Europe. In spite of this, the prospects for the chemical industry are mostly optimistic, as illustrated, for example, by the latest prognosis of the European Chemical Industry Council of June 2006, which foresees output of the chemical industry in the EU25 to grow by 2.6% in 2006 in comparison to 2.4% in 2005. In 2007, the growth rate is expected to drop to 2.2%.

### Current Situation and Future Prospects of the Pharmaceutical Industry

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The pharmaceutical industry (NACE 24.4) is a category of fine chemistry, its typical feature being the high degree of valorization of basic raw materials. The added value in drugs and substances is based on technologies that require demanding research and development and a skilled labour force. The pharmaceutical industry is divided into two product groups – the manufacture of basic pharmaceutical products (NACE 24.41) and the manufacture of final pharmaceutical preparations (NACE 24.42), represented in the CR mainly by generics. In 2005, for example, class 24.42 accounted for more than 72% of the sector’s total revenue.

### Current Situation in the Sector

In 2005, the Czech pharmaceutical industry accounted for 16.8% of total revenue in the chemical industry (NACE 24), for 25% of the industry’s book added value and for 23.7% of the number of employees. In terms of the manufacturing industry as a whole, this sector accounts for approx. 0.9% of revenue, for approx. 1.5% of book added value and for approx. 0.7% of the number of employees.

A total 46 business entities with 20 or more employees are currently operating in this sector. In the past few years, most Czech pharmaceutical firms have been on the receiving end of foreign capital, mainly American, British, Swiss, and Croatian investment. This has undoubtedly helped raise their competitiveness on both the Czech and foreign markets.

According to expert estimates, nearly EUR 2.15 billion was spent on medicines in the CR in 2005, and this volume continues to rise year after year. Between 2002 and 2004, medicinal expenses grew year-on-year by 10%, while in 2005 the growth was only half that figure. The CR holds a leading position in Europe in the number of daily doses. In terms of money spent on drugs, however, the CR ranks lower on the European scale. Drugs in the CR are cheaper than elsewhere on the continent, as most of them are generics. As regards health protection, the sector remains continuously in the centre of investor interest. This is reflected in the large number of investment projects, which have already been completed or are being implemented by pharmaceutical companies such as ZENTIVA, WALMARK, FARMAK, CHEMOPHARMA, BIOVETA, PLIVA-LACHEMA, SYNTHON, and others.

To draw a comparison, it is interesting to note that in 2000 this sector employed more than 477,000 people in the EU15, less than 2% of the EU manufacturing industry (in the CR this was only 0.74% in 2005). In the EU,

### Basic indicators of sector 24.4 in the period 2000–2005

<table>
<thead>
<tr>
<th>Item</th>
<th>2000</th>
<th>2002</th>
<th>2004</th>
<th>2005*</th>
<th>05/04 (in %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenues from the sale of own products (const. prices)</td>
<td>407</td>
<td>604</td>
<td>709</td>
<td>857</td>
<td>120.9</td>
</tr>
<tr>
<td>Number of persons employed</td>
<td>6 567</td>
<td>8100</td>
<td>9177</td>
<td>9955</td>
<td>108.5</td>
</tr>
<tr>
<td>Exports (current prices, CPA)</td>
<td>272</td>
<td>319</td>
<td>437</td>
<td>563</td>
<td>128.8</td>
</tr>
<tr>
<td>Imports (current prices, CPA)</td>
<td>844</td>
<td>1168</td>
<td>1551</td>
<td>1726</td>
<td>112.3</td>
</tr>
<tr>
<td>Labour productivity based on book added value (const. prices) in EUR thous. per employee</td>
<td>25.6</td>
<td>32.0</td>
<td>27.9</td>
<td>31.6</td>
<td>113.3</td>
</tr>
</tbody>
</table>

* estimate

CPA – Classification of Products by Activity

Source: Czech Statistical Office, calculation of the Ministry of Industry and Trade
too, large firms with 250 or more employees dominate the sector, by generating 80 % of total book added value, while small enterprises with up to 49 persons generate a mere 4 %. The revenue of the pharmaceutical industry in the EU25 in 2004 amounted to EUR 165 billion, accounting for 28.2 % of total revenue of the NACE 24 branch, while in the CR this was only 17.5 % in that same year. Added value per worker in the pharmaceutical industry in the EU25 reached EUR 31 000, while in the CR the figure in 2004 amounted to less than a quarter of that, namely EUR 1163 million. In terms of kilogram export prices, Czech exports, too, lag behind developed countries, with CR exports equal to just 40 % of the country’s kilogram import prices. Even the largest Czech pharmaceutical firms lag far behind global leaders. By far the largest of them is ZENTIVA a.s., which generated approximately EUR 420 million in revenue in 2005, while the revenue of the world number one, PFIZER, USA, amounted to EUR 38 billion, roughly ninety times the amount of Zentiva’s revenue.

It is clear from the table on p. 4 that in 2005 most indicators of the sector were developing favourably, with the exception of the balance of trade. The deficit amounted to EUR 1163 million, the highest of seven product sectors of the chemical industry. It is necessary to keep in mind, however, that in terms of NACE calculations, i.e. where imports only serve the sector’s own needs, the balance of trade is slightly positive, with a surplus of approximately EUR 145-150 million.

First Half of 2006
In 2006 (figures for the first half) the development of revenue in the two sub-sectors varied. While in sub-sector 24.42, revenues grew by more than 3 %, in the basic pharmaceutical products sub-sector they dropped by nearly 6 % in comparison with the same period of 2005. This suggests that in 2006 revenue in the sector will most probably increase only slightly, by approx. 1-2 %, and the same trend is likely to affect book added value. In terms of foreign trade, on the other hand, pharmaceutical exports from the CR increased by 17.3 % between January and August 2006 in comparison with the same period of the previous year, while imports increased by a mere 0.6 %. This trend can be viewed in a positive light, as the negative balance decreased by nearly EUR 60 million.

The Sector’s Outlook for the Immediate Future
The outlook for the sector’s immediate future is favourable, as the affect of cyclic fluctuations on the demand for pharmaceutical products is minimal in most significant economies. Future development will, however, largely correlate with the ageing of the population as well as with progress in medicine and with the development of technologies, etc. Demand in the area of veterinary products will be equally dependent on development trends. At the same time, the interest of investors in pharmacy is expected to last.

Undoubtedly the most important event in pharmacy in recent years was the merger in 2005 of Léčiva, a.s. and Slovakofarma, a.s. to ZENTIVA, a.s. The resulting business entity ranked 46th among the TOP 100 largest Czech companies in terms of revenue. Zentiva has thus established a leading position for itself in Eastern Europe in the manufacture and distribution of brand generics. It has strengthened its position on the Polish and Russian markets and entered the Romanian market with its acquisition of Sicomed. From a long-term point of view, Zentiva’s shares are amongst the most successful titles on the Prague Stock Exchange. They are also traded on the London market. Other pharmaceutical firms are planning to increase their production in the coming years. This sector is thus expected to become one of the most dynamic sectors in the Czech chemical industry.

Irrereplaceable Role of the Chemical Industry

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The chemical industry and pharmacy (NACE 24) play an irreplaceable role in this country’s manufacturing industry, as its products are used in practically all areas of the Czech economy.

In 2005, this sector accounted for 5.4 % of the revenue of the Czech manufacturing industry, for 5.6 % of book added value and for 3.1 % of employees. The NACE 24 branch is divided into seven product sectors, where 60 % of total revenue was accounted for by basic chemicals, 17 % by pharmaceuticals and other products, 10 % by detergents, cosmetics, and perfumes, 9 % by fine chemistry products and chemical fibres, 3 % by paints, and the remaining 1 % by pesticides and agrochemicals.

In view of the character of the branch, the decisive share of revenue and created added value is accounted for by firms with over 250 employees. The most successful firms in terms of revenue in the TOP 100 ranking for 2005 included five chemical firms with the UNIPETROL petrochemical holding in third place and its affiliation, CHEMOPETROL, 21st.

Exports and Imports
The branch also has an important position in terms of trade exchange. In
2005, chemical exports amounted to EUR 3.7 billion and imports to EUR 6.4 billion, which lead to a deficit of EUR 2.7 billion. Germany remains the CR’s top partner in chemical trade, with a turnover of EUR 2.7 billion in 2005, of which Czech exports totalled EUR 0.9 billion and imports EUR 1.8 billion. Germany was followed by Slovakia (turnover of EUR 853 million) and Poland (turnover of EUR 705 million).

Economic Results Continue to Improve
The economic results of the branch for 2005 can be characterised as favourable, as most of the main industrial and financial indicators showed an increase in comparison to 2004. For instance the volume of book added value was up by 8.4 %, revenues up by 13.1 %, exports up by 21.5 % and labour productivity based on book added value was up by 6.8 %. The number of employees in the period under review grew by 1.3 %.

Investment
The volume of gross investment in the branch in recent years has ranged around EUR 286-325 million. The most important projects completed in 2005 and 2006 include the opening of two new plants – for the production of low-molecular resins and the production of unsaturated polyester resins; the expansion of aniline production, installation of a new ammonia reactor, the launch of several new pharmaceutical production lines and the expansion of titanium white production.

Economic Development in the Branch in 2006
Current figures indicate that results for the year 2006 could be slightly higher than those for the previous year: revenue for the first half rose by a mere 1.7 % in comparison with the same period of 2005, monthly revenue per employee went up by the same percentage, whilst the number of employees dropped by 3.6 % on a year-on-year basis. The reasons for this include the slight slackening of economic activity in the CR as well as on foreign markets and in particular the growth of oil prices and the prices of other sources of energy. The performance of leading Czech chemical companies varies greatly. The revenue of CHEMOPETROL in 2006, for instance, grew dynamically, whilst in the case of other affiliations of the UNIPETROL holding, such as KAÚCUK and SPOLANA, revenues remained stagnant. This may be caused to a certain degree by the fact that these companies were offered up for sale at the beginning of 2006. The development of foreign trade in chemical products remained dynamic and the turnover of the NACE 24 branch in the period between January and August rose by EUR 902 million in comparison with the same period in 2005, although the deficit for the same period rose by EUR 255 million, of which the NACE 24.4 (pharmaceuticals) and NACE 24.1 (basic chemicals) displayed the highest deficit.

Position of the Czech Chemical Industry in the European Union
The Czech chemical industry as well as the Czech chemicals market are relatively small on an international scale, both in terms of turnover and generated added value. According to EUROSTAT figures for 2004, total revenue in the

The Immediate Prospects of the Branch
One of the decisive factors for the further development of the chemical industry in the CR and the world is the development of world oil prices. This, together with the growth of energy prices, mainly natural gas, strongly influences the competitiveness of the branch. The businesses most strongly affected are those with the highest consumption of oil and oil products. Here too, however, great differences can exist, as certain firms have prepared well for this development and can make effective use of oil whilst profiting from the high demand for chemicals and from the favourable global economic development. Another great challenge is the adoption of the new REACH chemical legislation, which comes into effect in 2007. It will burden the manufacturers, importers and distributors of chemicals and a number of manufacturing branches. The next development of the Czech chemical industry will no doubt be influenced by the reorganisation and restructuring of the UNIPETROL petrochemical holding, which accounts for more than 50 % of the total revenue of this branch in the CR.

On the whole, however, the immediate prospects of the Czech and European chemical industry can be viewed optimistically. This is confirmed by the prognosis of the European Chemical Industry Council (CEFIC) published mid-2006, which expects production in the EU25 to grow by 2.6 % in 2006 year-on-year and the growth rate to slow to 2.2 % in 2007. The expectations for the Czech chemical industry in the near future are similar, although the growth of revenue in 2006 and 2007 is not likely...
to reach the 2004 and 2005 record levels. The Czech Republic's joining the EU in the chemical industry has facilitated this country's access not only to the EU market, but also to markets in other territories. This has been reflected in the exchange of trade, easier access to top technologies and know-how and in the results of science and research. Furthermore, it has opened up new possibilities for the involvement of the Czech Republic in international research projects of the EU.

On the other hand, however, the enlargement of the EU by ten new member states has led to keener competition, in the face of which only those business organisations that offer innovated products and meet the requirements of both sustainable development (IPPC, EMAS, Responsible Care, etc.) and the new REACH chemical legislation are able to succeed.
The principal time indications in the Draft REACH Regulation of the European Parliament and Council, a new regulation of the European Communities for chemicals, foresee its approval by the end of 2006 and its coming into effect as of 1 April 2007. The document will replace several dozen current legal documents of the EU that govern the handling of chemicals. The principles of the new legislation include a unification of regulation, the application of the precautionary principle to govern the handling of chemicals, and the shifting of the cost burden to enterprises. Regulation in the European Union will be carried out from one centre - the newly established European Chemicals Agency.

The White Paper and REACH
In February 2001, the Commission opened the White Paper Strategy for a Future Chemicals Policy for public discussion. The submitted set of principles embodies a proposal for a strategy for a future chemicals policy that is acceptable to all chief European interest groups. Its principal aim is to ensure the protection of public health and the environment (including the minimisation of the use of animals for testing), the competitiveness of industry and to uphold international commitments laid down by the WTO. In other words, its aim is to ensure a sustainable development of the chemical industry. Five and a half years of gradual development of the appearance of the "Proposal for a Regulation of the European Parliament and Council concerning the Registration, Evaluation, Authorisation, and Restriction of Chemicals" (REACH) have since passed.

REACH and Industry
One of the chief ideas of REACH is the unification of requirements that determine rules for the manufacture, marketing, and use of chemicals, chemical substances in preparations, and chemical substances in products.

The Draft REACH Regulation not only affects the chemical industry, but impacts other sectors that use chemicals, such as the automobile, footwear, and textile industries, electrical engineering, the pulp and paper industry, etc. Although the majority of the new, important obligations ensuing from this draft relate to manufacturers, importers and distributors, certain duties also apply to sellers.

Activities of the Association of Chemical Industry
The Association of Chemical Industry of the Czech Republic (SCHP CR) co-ordinated its stance with Czech members of the European Parliament, with the VCI (German Association of Chemical Industry) and with the chemical associations of certain Central European countries – members of the VISEGRAD group (Poland, Slovakia, Hungary, Slovenia, CR). The SCHP CR contributed to the adoption of new European legislation by promoting the inclusion of the "one substance, one registration" proposal. The arguments, which helped push through the interests of its members, included results of analytical studies of the expected impacts of the forthcoming implementation of REACH on the industry of the Czech Republic – the chemical, pulp and paper, automobile and textile industries. The SCHP CR partook in these studies after it was entrusted with this task by the Czech Ministry of Industry and Trade, the Ministry of the Environment, the Ministry of Labour and Social Affairs and by the The Institute for Prospective Technological Studies in Sevilla (IPTS/JRC – part of the European Commission). The findings of these studies reveal the most vulnerable areas of the chemical industry in terms of REACH implementation: the greatest impact would be felt by manufacturers of special chemicals and small and medium-sized enterprises. For these companies, but not only for them, SCHP CR is preparing a special service that will use standard information on REACH to provide REACH information (REACH HelpDesk) and above-standard business services (REACH CENTRUM CZ) for the implementation of REACH.

Further information on REACH is available at www.schp.cz, see heading "Business Environment in the CR".

Czech Technology Platform for Sustainable Chemistry
The Czech Technology Platform for Sustainable Chemistry (CTP SusChem) was established on the initiative of the Association of Chemical Industry of the CR at the end of 2005 as the first ever Czech technology platform. Its mission is to support activities and initiatives aimed at promoting chemistry and the chemical industry and all related scientific, research,
technology and innovation activities in the Czech Republic.

Chief Aims of CTP SusChem
The chief aim of CTP SusChem is to raise the competitiveness of the Czech chemical industry, to build a bridge between science, research and industry in the area of chemistry, to promote innovation activities as well as scientific and technical development in the chemical industry, and to help the Czech Republic become involved in the core activities of the European Technology Platform for Sustainable Chemistry (ETPSusChem).

Key Ways of Engaging the Czech Republic in the European Technology Platform
Keys ways of engaging the CR in the European Technology Platform include drawing up a vision of the sector’s development, preparing a strategic research programme, initiating and carrying out scientific and technical research, laying down a strategy for the development of modern chemical technologies and co-operation in outlining policy and legal regulations for the stimulation of innovation activities.

Membership of CTP SusChem
Pharmacy, special chemistry, and related disciplines are among the most forward-looking branches in the long-term outlook. Investment in these disciplines is therefore growing, and the Czech Republic is no exception. Moreover, the CR can boast a rich history of remarkable achievements: polarography, contact lenses, and other breakthrough inventions have their roots in the Czech Republic.

One of the most promising areas of research and development are biotechnologies. At the end of 2005, there were 63 biotechnological companies and more than other 220 entities dealing with biotechnological research in the Czech Republic.

Close Links with Universities
Each year, Czech universities turn out approximately 7 500 fresh master graduates with degrees relating to life sciences in one way or another. Universities in the CR are not concentrated only in and around the capital city, but are scattered all throughout the country's regions. Recently, the Academy of Sciences of the CR announced their plan to open a completely new biotechnological centre. It is to be based in the Central Bohemian Region not far from Prague, and is to focus on nano-technologies, pharmacology, the use of biomaterials, and therapy with the help of stem cells and drug testing. The Academy estimates, that the construction of the centre and the provision of top-standard laboratories in the compound. Companies will thus be able to co-operate, for instance, with the University Hospital, where clinical evaluations of medicines can take place," says Jiří Hudeček, Director of the South Bohemian Innovation Centre, which shares responsibility for the project together with Masaryk University.

Another project to be launched in Brno is the ICRC Brno International Clinical Research Centre, which is to become a unique European clinical and research educational facility specialising in cardio- and neuro-vascular diseases, internal diseases, neurology, and partly in oncology. The project will be carried out under the auspices of the prestigious American Mayo clinic. "We are trying to give maximum support to investment in research and development, as these are long-term projects that create job opportunities for university trained researchers and they will raise the Czech Republic to a higher level," Tomáš Hruďa, Managing Director of CzechInvest Agency, explains. "Quite recently CzechInvest helped prepare an Internet portal, www.gate2biotech.cz, devoted to biotechnologies in the CR."

The latest foreign investment in medicine in the Czech Republic, announced at the end of November, will be that of Synthon, which will restructure its chemical plant in Blansko near Brno into a purely pharmaceutical works and will begin manufacturing medicines. "Synthon will transfer its production from other European countries to the Czech Republic and in addition, it will enrich its technology with the results of the work of its two research centres, which have been operating in the Czech Republic for some time now," Patrik Reichl, Director of the regional branch of the Czech Investment and Business Development Agency in Brno, adds.

“Thanks to international biotechnology projects, the Czech Republic is becoming involved in important projects of applied research. Work on such projects is a good reference for the entry of global investors operating in the bio-industry and in pharmacy,” Tomáš Hruďa concludes, adding that in their search for Czech partners investors do not limit themselves to particular regions, but instead look for partners in the whole of the Czech Republic.

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Education of Young Pharmacists and Researchers in the Czech Republic

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The Hradec Králové Faculty of Pharmacy, Charles University, founded in 1969, is one of the youngest of the 17 faculties of Prague’s Charles University. The school is developing dynamically. At present, there are approximately 1000 students enrolled in the traditional pharmacy course completed by a Master’s Degree. In the newly established course for medical bioanalysts completed by a Bachelor’s Degree (with the possibility of continuing studies in a follow-up course for a Master’s Degree) the number of students is approximately 250. Pharmacists are educated as all-round specialists in pharmaceuticals and undergo complex preparation founded on a practical connection between chemistry and biology. A well-balanced combination of these two specialisations, together with disciplines that focus on practical skills in pharmacy and on sensitivity towards the needs of patients, enables the graduates to communicate with chemists, biologists, physicians, technologists of pharmaceutical firms, and various other specialists. Hence, the graduates have ample opportunities of asserting themselves in practical life, and even though most of them still prefer to work in pharmacies, an increasing number of them accept positions in the pharmaceutical industry or in chemical or biological research. The branch for medical bioanalysts educates specialists for work in microbiological, hematological, immunological, and other laboratories, which have become a standard part of many healthcare establishments. Studies at the faculty are fully compatible with education in the European Union and are also accredited in the English language.

Educating Research Specialists

In the context of the ongoing boom in chemical and biological disciplines in the third millennium, the faculty provides unique conditions for the development of science and learning to a large number of students, especially in the study programmes leading to a PhD. degree, the principal aim of which is to educate specialists for research in different pharmaceutical disciplines. Attention focuses on new pharmaceuticals, mainly small molecules of organic origin, which have the capacity of neutralising or at least correcting pathological processes in the human organism. A typical feature of the faculty is its multidisciplinary character – groups here deal with all aspects of pharmacy, from seeking out new active substances to their distribution in the form of preparations with everything going on under one roof. Study programmes at botanical departments (Department of Pharmaceutical Botany and Department of Pharmacognosy) concentrate on the research of natural substances, both on the isolation of new substances (e.g. flavonoids with antitoxic effects) and the possibility of producing selected substances from plant cultures. Teams dealing with the synthesis of potential drugs, such as tuberculocidal, fungicidal and cytotoxic substances, etc., work in the chemical departments, namely the Department of Inorganic and Organic Chemistry and the Division of Drug Synthesis of the Department of Pharmaceutical Chemistry. The former also houses a part of the Centre For New
Antivirals and Cytostatics led by Professor Antonín Holý from the Academy of Sciences of the Czech Republic and a group working on the development of substances that enable the transdermal penetration of drugs.

Comprehensive research of modern forms of drugs and their administration to patients takes place at the Department of Pharmaceutical Technology. The transformation of medicines in the organism is examined by students and academics of the Department of Biochemical Sciences (transformation of substances in the organism), the Department of Biological and Medical Sciences and the Department of Pharmacology and Toxicology (e.g. transfer of medicines through the placenta, molecular, and biological aspects of the effects of medicines, etc.). An important segment of pharmacy studies is the analysis of substances, carried out at the Drug Analysis Division of the Department of Pharmaceutical Chemistry and the Department of Analytical Chemistry. Last but not least, there is the Department of Social and Clinical Pharmacy, where PhD. students and employees carry out an attractive study of drug interactions in addition to dealing with practical aspects of pharmaceutical services. The results of their work are published in foreign magazines with an impact factor and the high standard of their work gains generous financial support, mainly from grant agencies, but also from pharmaceutical companies. The great improvement of the faculty's technical facilities in the past few years is largely attributable to this support.

Co-operation with Czech and Foreign Institutions
As part of its research efforts, the faculty cooperates regularly with Czech and foreign entities. In the academic area, these include universities in the EU (e.g. in Great Britain, Portugal, Spain, and Germany), in the former Soviet Union, and the USA. The faculty's traditional partner among companies is Zentiva, a Czech company, as well as smaller manufacturers in the region (Herbacos-Bofarma).

Appreciation of Research Work
Appreciation of the good quality of research work carried out by the faculty's employees and students takes the form of the grants mentioned above, as well as a number of specific prizes, which employees and students win each year. In addition to the usual prizes awarded by associations and student foundations (Hlávka Foundation, etc.), they also receive awards at international student conferences. Examples of success include the Gold Medal awarded at the Eureka 1997 world review of inventions in Brussels for the "New transdermal penetration enhancer" and the recent victory of one of the faculty's students at the world congress of industrial pharmacy in Brazil, where she won the best presentation award.
Zentiva is a modern pharmaceutical company, which specialises in the development, manufacture, and sale of modern branded generics. Zentiva is the leading company in the Czech, Romanian, and Slovak markets and as a result of this and its rapid growth in Poland and Russia it is now one of the main suppliers of pharmaceuticals in Central and Eastern Europe. Recently Zentiva announced that its business is doing well with revenues in 2006 expected to increase by approximately 20 %.

In 2006 Zentiva won the Czech Employer of the Year award and retained its position as the third most admired firm in the Czech Republic. In order to understand the secret of the company's success, we interviewed Zentiva's Managing Director, Jiří Michal.

What, in your opinion, was the main reason why you won the 2006 Employer of the Year Award?
Perhaps it was the fact that Zentiva is a fast growing successful company which takes very good care of its employees. The former makes the firm attractive to job seekers, while the latter point ensures that our employees are happy to be working for the company. In 2006, more than ten thousand people applied to work at our company – clear proof of the attractiveness of Zentiva as an employer. Unfortunately we were only in a position to take on one hundred new employees.

What is the driver of your success?
Zentiva is unique in that its business is focused on the primary care market. This focus means that it can communicate directly with general practitioners, doctors who are the closest to patients on a day-to-day basis. We offer them good drugs and medicines for their patients. Until recently, drugs and medicines were covered by patents and supplied exclusively by the original manufacturer. As market laws changed, we have been able to introduce modern branded equivalents of these drugs, so called generics, at substantially lower prices. As a result, for the price of medication, previously used to treat one patient, we can now treat up to ten patients.

Zentiva operates in markets of the EU as well as those of East Europe. It enjoys leading market positions in the Czech Republic, Slovakia, and Romania and is growing rapidly in Poland, Russia, and the Baltic States. Are you planning to expand further?
The sale of pharmaceutical products is subject to very strict approval and regulatory procedures. This means that the process of entering a new market is not easy, just a matter of one or two days. Even the launch of a new product on a market where we are already established is not easy. That is why we must choose the new target markets very carefully and weigh up which of Zentiva's products are most suitable for that particular country. One factor which has been a great advantage recently in supporting our geographic expansion is that the Czech Republic is now a member of the European Union. This gives us access to its mutual recognition procedure for new drug registrations, which simplifies drug approvals in the EU member states.

Which drugs does Zentiva manufacture? And which country imports the largest amount?
Zentiva's three manufacturing plants are located in the Czech Republic, Romania, and Slovakia. Altogether they manufacture nearly three hundred different products, some of them in several forms, referred to as dosage forms. They differ from each other for instance in the way they are administered to patients or in the content of the active component. Our most successful products include drugs for reducing high blood pressure and medicines for the reduction of certain lipids (fats), particularly cholesterol. Other important product categories for Zentiva include pain killers, drugs for the treatment of the enlargement of the prostate gland in men and medicines which reduce gastric acid in order to treat ulcers. The territorial distribution of Zentiva's sales is perhaps best illustrated by the share of different areas in our overall revenues. In the first half of 2006, 38 % of our revenue came from the Czech Republic, 18 % from Romania, and 14 % from each of Slovakia and Poland.

Research and development is crucial to the development of the new drugs needed to support the pharmaceutical industry's growth. What research and development is Zentiva engaged in?
Zentiva is not a company that develops completely new molecules capable of treating previously incurable diseases or disorders. This is an immensely costly and lengthy process and this task is the focus of leading global pharmaceutical companies often referred to as originator firms. In contrast Zentiva's research focuses on the development of molecules that already exist on the market and whose patent protection is expected to expire in the foreseeable future. In addition, we are investigating new ways of delivering these molecules into the body. For example using these drug delivery techniques it is possible for the patient to take a drug just once a day instead of, let us say, every eight hours, whilst ensuring that the necessary quantity of the active part of the drug substance is present in the body at all times. Another promising research direction for Zentiva includes a new method of drug administration, which will make it possible to deliver the active drug substances to the exact location in the body where it is intended they exert their positive effect. This so called targeting could be very important for the treatment of cancer using chemotherapy, as it will restrict the drug's unfavourable effect on other tissues in the body and as a result could significantly reduce side-effects. We are currently co-operating closely with experts from the Academy of Sciences of the Czech Republic to develop these targeted cytostatic drugs. However, at present this research is in a phase where this novel approach is being tested on tumour cells in the laboratory, so its use to treat patients with cancer in a clinical setting is still very far off.

Nada Vávrová
Walmark Aspires to Become Europe’s Largest Dietary Supplement Manufacturer

Walmark, originally a family business, was established in 1990. In 1991 it began its business activities and soon after that launched its own production of non-alcoholic beverages. Since 1992 it also manufactures pharmaceutical and para-pharmaceutical preparations. Today it is a joint stock company fully focused on the manufacture of dietary supplements and pharmaceuticals. We discussed Walmark’s exports and further development as well as what it means to be a “private Czech pharmaceutical firm” today with the company’s Managing Director, Mr Tomáš Macura.

You have managed to turn a small family business into a renowned pharmaceutical brand. What is the company’s strategy and what, in your opinion, makes Walmark exceptional?

Walmark is testimony to the fact that even under local Czech conditions a firm can develop and expand successfully in the demanding branch of pharmaceutical production practically from scratch, with minimum initial capital and without foreign know-how. Admittedly, it was to our advantage that at the time we launched the production of dietary supplements, the Czech market was still unsaturated and we did in fact contribute significantly to its development. We were not afraid to go beyond the territory of the Czech Republic and expand to foreign markets. We knew that success was unlikely to come in the absence of a good business plan, readiness to work hard, an excellent team of collaborators, without firm ethical principles, and of course without a great deal of luck.

What share of your revenues is accounted for by exports? Which countries do you export to?

Today, the company manages its exports via its branches in eight European countries (the Czech Republic, Slovakia, Poland, Romania, Hungary, the Ukraine, Lithuania, and Bulgaria) and sells its products to more than twenty other countries worldwide via local distributors. Thanks to the intensification of foreign trade activities in 2005, revenues accomplished that year on foreign markets exceeded for the first time those generated in the Czech Republic. Their share in the company's consolidated turnover for 2005 amounted to 56 %. We are doing very well in Estonia, Kazakhstan, Azerbaijan, and Serbia, and are gradually improving co-operation and strengthening our position on markets in Latvia, countries of the former Yugoslavia (Slovenia, Croatia, Bosnia and Herzegovina), in Cyprus and Macedonia. We have also managed to penetrate the market in Greece and France.

Could you list your most important export territories? Which products are selling best on foreign markets?

WALMARK is the leader on the dietary supplements market in the Czech Republic, Slovakia, Romania, and Bulgaria. In Poland we rank in second place for the time being, in Hungary we rank third and fifth in Lithuania. The focus of our interest is Central and East Europe, however our export department is also searching for opportunities on markets beyond Europe. In order to succeed on a foreign market, it is necessary to carefully weigh up the specifics of that particular market, to determine the best marketing strategy and to choose those products which are most suited to that market. Our product range comprises 200 items; however, each country is different and requires something else. In general, our brand products are the most successful from among our products. The most popular of them are Arthrostop Plus, GinkoPrim, Martians, Prostenal, Calcium-Magnesium-Zinc and Urinal.

Recently you became the majority owner of Aminostar, a manufacturer of dietary supplements and nutrition for sportsmen. What does this step mean for Walmark?

We hope the acquisition of Aminostar will bring above all an expansion of our operations by another segment of the market. Nutrition for sportsmen provides us with an opportunity to combine certain operations with our dietary supplements and pharmaceutical production facilities, for instance in terms of development, manufacture, sales, and marketing. It is a segment with great potential for growth not only in the Czech Republic, but also in other countries. For the introduction of Aminostar on new foreign markets we shall employ the network of our foreign branches and the activities of our export department.

Could you give an indication of what you have in store for 2007?

As far as dietary supplements are concerned, we shall launch at least five completely new preparatives on the market in 2007. We also plan to add prescription drugs to our current range of over-the-counter medicinal drugs. In the area of nutrition for sportsmen these will include products such as new protein and energy drinks intended for consumers from among cyclists.

Nada Vávrová
PLIVA-Lachema a.s. is a leading Czech pharmaceuticals manufacturer. The company’s history dates back to the 1950s, when Lachema, National Corporation, as it was then known, began to manufacture laboratory and specialty chemicals. In the 1960s, the company began to focus increasingly on the health service. In the 1980s, its production programme was expanded to include its first generic anti-tumour preparation, the cisplatinum injection, shortly followed by other cytostatics and antidotes for the treatment of cancer.

At that time, Lachema was still a company with merely a local focus, and its main markets in Central and Eastern Europe. In the 1990s it was clear that if the company wanted to modernise and become part of the major European and world markets, it needed to find a major strategic partner. In 1999, PLIVA d.d. of Croatia became a majority shareholder in the company. Lachema became part of the PLIVA Group and since 2000 it has been operating under its new trade name, PLIVA-Lachema a.s. In October 2006, PLIVA d.d. merged with Barr Pharmaceuticals, Inc. to create the world’s third largest generics pharmaceutical company. As a member of the Barr global group, PLIVA-Lachema, along with its subsidiaries, including PLIVA-Lachema, benefit from the numerous opportunities and advantages that stem from being part of a leading global generics company.

Core Production Programme
PLIVA-Lachema’s core business activities centre on the development and production of generic drugs, particularly cytostatics, which suppress the growth and multiplication of cells. The company also manufactures cardiovascular drugs and antiviriotics for herpes virus infections. The company employs the most advanced technologies and state of the art facilities in the manufacturing process.

Shortly after its acquisition of Lachema, PLIVA d.d. began to develop a fast and dynamic business, its main goal the construction of a centre of excellence for oncology products with the aim of focusing on operation excellence in the area of generic products. As the Central and East European markets were already long-established markets, PLIVA-Lachema began to concentrate on expanding its business activities via PLIVA’s sales and distribution channels to West Europe and the US. Since 2005, the company has been using two approaches in its efforts to penetrate West European markets. One approach is the sale of products directly to customers and the other the sale of licences to trading partners.

In 2004, PLIVA-Lachema was approved by the US Food and Drug Administration (FDA) as a company suitable for the production of active pharmaceutical ingredients and sterile dosage forms for the American market. Subsequent strong marketing and development strategies enabled the company to launch its product Carboplatin on the US market. Carboplatin interferes with the growth of cancer cells and is mainly used to treat cancer of the genital organs, head, neck, lungs, and bladder. A number of other products are currently undergoing the registration process with US regulatory authorities. In 2006, the company successfully launched Carboplatin in Japan through a local partner.

Research and Development in PLIVA
In the past few years the company has been investing in all its business activities, research and development, however, heads the list of its top priorities. The main focus is on the development of cytostatic preparations. The company operates an in-house research and development base and its own development and manufacturing facilities in Brno. PLIVA d.d. chose PLIVA-Lachema as one of its three major centres of excellence that specialise in cytostatics. Another area of interest is the development of high-efficiency preparations.

To ensure the production of its own pharmaceuticals, PLIVA-Lachema is also engaged in the development of active pharmaceutical ingredients and intermediates, particularly cytostatics.
Lovochemie, a.s., is the largest manufacturer of industrial fertilisers, in the CR. Its production programme has greatly contributed to the development of Czech agriculture.

The production of fertilisers dates back to 1904, when Adolf Schram built a sulphuric acid and superphosphate manufacturing plant on the outskirts of Lovosice. After the Second World War, a new sulphuric acid production facility was built and a few years later the construction of a new nitric acid and calcium nitrate block was completed. This gave rise to a chemical complex, very large for its time, called the Artificial Fertiliser Works. Its merger with the Czech Artificial Silk Factory gave rise to the Lovosice North Bohemian Chemical Works (SCHZ), established in 1958. During its existence, the original works were expanded to include five nitric acid blocks, a calcium nitrate plant, a combined fertiliser plant, a modern sulphuric acid unit, a superphosphate line and a number of smaller facilities. Its boiler room, waterworks, and factory siding were modernised. The Lovochemie joint stock company came into being in 1993.

Production Programme
Today, Lovochemie’s core programme involves the manufacture and sale of nitric and combined fertilizers in both solid and liquid form. These fertilisers are based on ammonium nitrate, calcium nitrate, multi-component NPC and NP fertilisers, granulated mixed fertilisers, granulated ammonium sulphate, Cererit, Lovogreen and carboxymethyl cellulose.

Fertilisers for Export
A large part of Lovochemie’s production output is intended for export, mainly to demanding West European markets. The quality of its products has opened the way to EU states for Lovochemie’s fertilisers, although the firm has also got a foothold on markets in Latin America and Asia. Each year, the company exports approximately one-half of its total output.

Investment in Production
Lovochemie invests large sums in new technologies. For example in 2003 it built a new nitric acid facility, in 2005 it reconstructed its ammonia unit and in 2006 modernised its waste water treatment plant. The company is working intensively on projects to reduce the impact of its production on the environment and to further improve the safety of its technologies. Since 1990, new environmental structures have cost the company more than EUR 47 million, and further investment projects are in the pipeline.

Research and Development
The company co-operates on research and development with the Inorganic Chemistry Research Institute in Ustí nad Labem. This form of co-operation has resulted in the development of new fertiliser types, such as Lovogreen, a new type of lawn fertiliser, granulated ammonium sulphate, and in the testing of new raw materials for the manufacture of fertilisers (e.g. surface finishing agents). Another benefit of this co-operation is the further improvement of existing technologies.
Specialist in the Manufacture of Active Pharmaceutical Ingredients

Jan Batka, FARMAK, a.s., e-mail: batka@farmak.cz, www.farmak.cz

FARMAK is an independent Czech manufacturer of active pharmaceutical ingredients (APIs), intermediates, and chemical specialities. Its manufacturing equipment is subject to regular inspection by the State Institute for Drug Control and the Food and Drug Administration (FDA), and it meets the requirements of current Good Manufacturing Practice. Favourable customer audits of the company’s quality system are instrumental in helping it to retain its existing clients and win new ones.

The company provides a wide range of services, from laboratory research and pilot plant production to commercial production processes. FARMAK products are accompanied by documentation required by the European Drug Master File (EDMF), the United States Drug Master File (USDMF), and Certificates of Suitability of the European Pharmacopeia (CEP), prepared in accordance with current international directives.

Production and Development
The company’s management attaches great importance to innovation activities. New products are sophisticated compounds prepared by multi-step syntheses that require special know-how, mainly in the area of heterocyclic chemistry (alfuzosin, brimonidine, moxonidine, tizanidine, zolpidem, quetiapine, etc.). The company’s research and development team is currently working on more than ten new projects. In-house company research and development of processes for the manufacture of generic substances is a valuable competitive advantage for FARMAK.

An important role in the company programme is also played by custom manufacturing and custom development, an area where the company has many years’ experience. Its highly erudite research team works closely with universities and it is able to meet the most demanding requirements of customers. In 2007, FARMAK launched customer production of disinfectants for use in the health service and communal hygiene for Ecolab.

Investment in Production Technology
FARMAK invests regularly in its production equipment. In 2004 it put a new QC and laboratory centre into operation, in addition to a new state-of-art manufacturing unit. For 2007 the construction of a kilolab unit is foreseen. Such investment makes it possible for FARMAK to introduce modern technological processes, which, moreover, have a favourable effect on the working milieu and the environment.

The company pays considerable attention to environmental and safety issues – it is a holder of the RESPONSIBLE CARE certificate, awarded in the chemical industry.

Pharmaceutical Substances for Export
FARMAK focuses strongly on export, which accounts for nearly 90% of company turnover. FARMAK maintains trade contacts in over 35 countries. Its most important export territories include the USA, EU states, and several Asian countries. Its most demanded active pharmaceutical ingredients include:

ALFUZOSIN HYDROCHLORIDE, BRIMONIDINE TARTRATE, MONONIDINE, QUETIAPINE HEMIFUMARATE, TIZANIDINE HYDROCHLORIDE, ZOLPIDEM TARTRATE, ZOPICLONE, and ESZOPICLONE.

The API group accounts for 87% of company revenue and is one of FARMAK’s traditional key product groups. Intermediates and chemical specialities, which form another product group, are intended as raw materials mainly for the manufacture of pharmaceutical substances.
Czech Chemical Research in the Course of History

Vladimír Janeček, Association of the Chemical Industry of the CR, e-mail: vladimir.janecek@schp.cz, www.schp.cz

The performance of the Czech chemical industry is not high and ranks the Czech Republic, together with Austria, Portugal, Greece, Hungary, Slovakia, Slovenia, Lithuania, Estonia, Latvia, Malta, and Cyprus among countries whose share in the turnover of EU states is equal to less than 1% of the performance of EU states.

Co-operation among scientists increasingly displays signs of international collaboration, both on the European and global scale. Yet, the contribution of Czech scientists to the results of world chemical science is clearly identifiable, especially in areas such as chemical processes in the human body, nature and in industrially applied processes. Outstanding chemists are generally well known in the Czech Republic and their achievements add to people’s better understanding of the importance of chemistry.

Outstanding Personalities in Czech Chemical Research in the Past, the Nobel Prize

The first Czech to be awarded the Nobel Prize for Chemistry (1959) was the physical chemist Jaroslav Heyrovský, who was awarded the prize for his invention and application of polarography. Acadianian Heyrovský was the founder of the Polarography Institute of the Academy of Sciences of the CR, and co-founder of the Collection of Chemical and Pharmaceutical Products. Heyrovský was awarded in 1975. Today, adamantan chemistry products are part of the product range offered by Lachema, s.r.o. Brno.

Adamantan is a compound with a fascinating structure and extraordinary properties. It was discovered in 1932 in the laboratories of the University of Chemical Technology Engineering (VŠCHTI) in Prague, the predecessor of today’s Institute of Chemical Technology, by professor Stanislav Landa and it was first synthesised by professor Vlado Prelog, graduate of VŠCHTI and holder of the Nobel Prize for Chemistry awarded in 1975. Today, adamantan chemistry products are part of the product range offered by Lachema, s.r.o. Brno.

Personalities of Current Chemical Research

One of the greatest Czech chemists of today is professor Antonín Holý. His greatest achievements include the discovery of active substances that combat the HIV virus, which leads to AIDS, and the hepatitis virus type B. The development of these active preparations required a chemical analysis of tens of thousands of precursors and a selection of those of them that had the required effect for combating the viruses. Gilead of California is a manufacturer of medicaments based on Holý’s chemicals, namely the product Vistide, which counteracts viruses that cause, for instance, gastric ulcers and retina inflammation. Viread, which halts the multiplication of the HIV virus, and Hepsera, which counteracts serum hepatitis type B. Atripla is a drug that combines Viread with another two preparations that combat AIDS.

Josef Michl is a member of the American National Academy of Sciences and currently the most frequently cited scientist of Czech origin. In the words of his teacher, Rudolf Zahradník, he is a “five-star general leading a global army of chemists”. Professor Josef Michl teaches at the Colorado University in Boulder and at academic organic chemistry and biochemistry and physical chemistry institutes in Prague. He is one of the co-founders of a relatively new scientific branch called molecular electronics (a part of applied physics, which focuses on the use of molecules as electronic components, both passive – e.g. resistors, and/or active – e.g. transistors).

A new generation of anti-tumour medicaments - polymer medicaments with cytostatic and immunomodulation effects developed by professor Blanka Ríhová, director of the Microbiological Institute of the Academy of Sciences of the CR, and by professor Karel Ulbrich, director of the Macromolecular Chemistry Institute of the Academy of Sciences of the CR, and their teams, have a number of advantages over conventional chemotherapy. The substance directly penetrates tumour cells, thereby strongly reducing the undesirable toxic effect on healthy tissue and organs. Moreover, it can be used in patients resistant to conventional chemotherapy, which they have undergone.

Czech Scientists Influence the Performance of the Chemical Industry

In addition to these excellent results in the area of basic research, thanks to Czech scientists, the chemical industry in the Czech Republic is also receiving impulses in the form of new “made to measure” technologies, which meet the requirements of specific investors. The implementation of these new technologies has a positive effect on the performance of the entire chemical industry sector.
Josef Pašek, a scientist, chemical technologist, and winner of the prestigious Czech Brain award, is the author of a number of important patents in applied research and technological innovation. The list of his research activities is immense. There can be no doubt, however, that his greatest achievement is the technology of aniline and cyclohexylamine production. What is the opinion of this significant Czech chemist on research and development, what kind of research has he partaken in recently and what is he working on at present?

What, in your opinion, is the quality of Czech chemical research?
Basic research in chemistry at the Academy of Sciences and at universities is of a fairly high level, applied research on the other hand is relatively poor. Czech chemical enterprises are not strong enough to build their own extensive research bases. A single global chemical company is yet to become engaged in chemical production in the Czech Republic, perhaps with the exception of Continental, who deals in the manufacture of tyres.

Where do you find the means for financing your research?
Recently, the Ministry of Education increased its contribution to universities, a step that is already having a tangible effect. Our research group receives part of its funds from two grants of the Ministry of Industry and Trade (Tandem Programme). This, among other things, helps keep talented people at universities. Further means stem from contractual co-operation with both Czech and foreign industrial enterprises.

How long did you work on the development of aniline? What process did your research have to undergo before your know-how could be sold to Japan by BC-MCHZ?
I adhere to the following principle: a process needs to be perfected continuously and every new project should bring some degree of improvement. We built our very first test unit in BC-MCHZ in 1975 based on the principle applied today. At that time, the unit fully covered Czechoslovak aniline consumption and served as a basis for the preparation of an aniline manufacturing plant with a capacity of 65 kt/year, which was put into operation in 1985.

Today, BC-MCHZ produces approximately 150 kt of aniline a year. Our process is energy-efficient and generates about twice as much steam as it itself consumes. We have gradually reduced the unit consumption of the catalyst. The aniline manufactured in our production process is of outstanding quality - the content of all organic impurities together amounts to approximately 0.005 %.

The know-how for aniline production is not "mine", it is the property of BC-MCHZ. A team made up of members of both the Institute of Chemical Technology and BC-MCHZ participated in the development of the process in the past, and they continue to do so today. I can merely be considered the chief author of the know-how. Tosoh of Japan appears satisfied with our process of aniline production, judging by its recent purchase of another licence from BC-MCHZ. Today, our process is used to make about 10 % of world aniline output.

Which other companies do you co-operate with on development?
I am the initiator of about 30 different processes, which have been realised in Czech, Slovak, and foreign industry. Our most important partners have been BC-MCHZ Ostrava, Duslo Šaľa, Slovakia, Deža Valašské Meziříčí, and Chemopetrol Litvínov. For about 10 years I have cooperated with Tamincos (Belgium) where several chemical processes we realised. For several years I have co-operated with Sulzer of Switzerland and Sulzprag, its representation in the CR. In the past three years, we have participated in several smaller projects with CIBA, another Swiss firm, now Huntsman.

What is the basis of this co-operation?
Each year we conclude a contract with every one of these companies for a defined research programme. Such projects encompass the complete development of the process as well as a survey of new possibilities. Companies require specific results and I must say that making money by co-operating with industry is by no means an easy task. I myself work as a consultant for BC-MCHZ, Tamincos, and Chemoprojekt.

Can you list any other significant processes that have originated in your laboratory and tell us how they are applied?
The most extensive I think has been the development of a process for the manufacture of antiozonants for Duslo Šaľa of Slovakia. Work on this project involved several years’ cooperation with the VUCHT Chemical Technology Institute in Bratislava. The process involves a continuous five-steps organic synthesis with a capacity of more than 2 t/h. Duslo is continuing in the expansion of its antiozonant production and it is the world's second largest manufacturer of these substances today.

Another one of our recent projects involved the separation of naphthalene from pyrolysis oil and the preparation of technical documentation for Sulzer, which in turn delivered the process to Chemopetrol. In co-operation with Chemopetrol we prepared know-how for the manufacture of technical dicyclopentadiene from pyrolysis petrol, and now we are looking for an investor for this process. In 2004 we opened a new dimethylaminopropylamine (DMAPA) plant at Tamincos. This substance is primarily used to make tensides for shampoos. In 2006, a hydrogenation station for refining distillation residues in methylamine production was also put into operation at Tamincos Leuna, Germany.

What are you working on at present?
Most of our current activities centre on the production of
amines, often of rather curious structure. Decades of work in
the area of amine synthesis have allowed us to gather
experience, which we are now in turn able to offer. Another
hobby of mine is rectification systems, used to separate
substances according to their different boiling points. I have
designed some 100 rectification columns, approximately 70 of
which have been built.

Nada Vávrová

New Opportunities for Biotechnology

Magda Sergejevová, Centre of Biological Technologies, e-mail: sergejevova@greentech.cz, www.greentech.cz

The Centre of Biological Technologies
was established at the Academic and
University Centre of Nové Hrady in 2004.
The objective of the centre is to educate
and train students in biotechnologies,
new technological processes, and to
raise the general level of education. The
research and education centre receives
considerable support from institutions
concerned with education and science
not only in the Czech Republic, but also
in neighbouring Austria. They include,
for example, the Johannes-Kepler-
Universität Linz and Kompetenzzentrum
für Holzverbundstoffe und Holzchemie
Linz, and Austrian technology parks in
Freistadt and Gmünd. On the Czech side
there are institutions such as the Faculty
of Biological Sciences and the Faculty of
Agriculture of the University of South
Bohemia, Institutes of the Academy of
Sciences of the Czech Republic, and
research profit and non-profit
organisations in České Budějovice. The
development of biotechnology firms and
the transfer of technologies into practice
benefit from existing close links between
incubated firms and biotechnological
research at the Academic and University
Centre.

The Centre Provides Services
to Businesses

Another objective of the Biotechnology
Park is to transfer technologies into
practice and to provide support to
biotechnology, biochemical, molecular-
biological and software firms. The
services provided by the Biological
Technology Centre are used especially by
companies dealing with biotechnologies.
The oldest spin-off firm of the Institute
of Physical Biology of the University of
South Bohemia is Gali-3D, a developer
of software for three-dimensional
representation of molecules. This system
is used for the presentation and
creation of three-dimensional films. The
services of the incubator are used for
presentations, training and the development
of other projects related to biomedicine
and software. PSI of Brno is another
company that co-operates with the
Institute of Physical Biology of the
University of South Bohemia and the
Academy of Sciences of the CR and
transposes company knowledge into
practice. PSI produces instruments and apparatus for the
measuring of photosynthesis. Other
firms that use the services offered by the
incubator include Biologické produkty
Trade and Bonapo, which together
produce pure pollen in laboratories and
pure spaces. One of the firms working at
the Centre of Biological Technologies is
B.P. Medical s.r.o., which focuses on the
production of bioactive substances from
micro-organisms. It uses the services of
the technological hall and the pure
environment of the solar photo-bio
reactor. Its new products are applied in
biomedicine and food processing. The
Centre also houses a laboratory for the
cultivation of tissue cultures at the USBE
Institute of Systems Biology and Ecology
of the Academy of Sciences, which
carryes out cytocompatibility tests of
biologically active substances based on
micro organisms and artificial
substances. The laboratory was
established under the framework of
cross-border co-operation with a similar
laboratory in Krems, Austria.

Application of Research Results

One of the outputs of the Centre of
Biological Technologies is the concrete
application of research results in
incubated firms. One such firm is B.P.
Medical s.r.o., which focuses on the
production and testing of bioactive
substances and artificial materials
designed for medical use. The target of
B.P. Medical s.r.o. in the incubator is to
replicate the devices and processes used
for the phototrophic cultivation of
seaweed and blue-green algae created
by researchers of the University and the
Academy so as to make the resulting
products competitive with biologically
active substances and testing standards
traded on the market.
Poll of Successful Companies Operating in the Chemical and Pharmaceutical Industries

Chemical Companies

**CHEMOPETROL, a.s., Litvínov**

436 70 Litvínov, Záluží 1, phone: +420 476 161 111, fax: +420 476 709 553, e-mail: info@chemopetrol.cz, www.chemopetrol.cz

- Turnover: CZK 28.7 billion – approx. EUR 966.3 million
- Number of employees: approx. 2,400
- Contact: Mr Pavel Veselý, e-mail: pavel.vesely@chemopetrol.cz
- Export: for example Germany, Poland, Italy, Turkey, and Russia

Chemopetrol is one of the largest petrochemical companies in the Czech Republic and one of the country's most important manufacturing companies. Chemopetrol is a subsidiary 100% owned by Unipetrol refinery and petrochemical holding, 62.99% of which are owned by the Polish consortium PKN Orlen. The company is a key supplier of products designed for further processing, especially in the chemical industry, but also in the plastics and pharmaceutical industries. Chemopetrol manufactures ethylene, propylene, polypropylene, benzene, ammonia, urea, and a large number of other commodities.

Chemopetrol is working to develop the key sectors of its business activities and is striving to strengthen its position on target markets by offering a wide range of petrochemical and agrochemical products and high-quality secondary services. Its continuous development is possible thanks to highly qualified staff and the company's capacity for innovation.

By practicing an open approach to partnership, Chemopetrol hopes to be perceived as a forward-looking company with a sophisticated corporate culture and a proactive attitude towards environmental protection and the development of the region.

**Could you indicate your most important export territories? What are your next plans for conquering foreign markets?**

Chemopetrol's main export territories are the EU states and other European countries, countries of the Middle East, as well as countries of the former Soviet Union.

Chemopetrol focuses primarily on meeting the demand of Czech customers, although we shall naturally continue to serve our long-term customers and address new customers in European countries.

**KAUČUK, a.s.**

O. Wichterleho 810, 278 52 Kralupy nad Vltavou, phone: +420 315 711 111, fax: +420 315 713 883, e-mail: info@kaucuk.cz, www.kaucuk.cz

- Turnover (2005): CZK 10.5 billion – approx. EUR 353.5 million
- Number of employees: 913
- Contact: Mr René Keller, e-mail: rene.keller@kaucuk.cz
- Exports: approx. 60%, for example to Germany, Austria, Italy, and Poland

KAUČUK, a.s. is a petrochemical company with a long tradition that dates back to 1954. The company manufactures a wide range of products. Its core programme focuses on the manufacture of plastics and styrene-butadiene caoutchouc. Styrene-butadiene caoutchoucs are produced under the trade name KRALEX. They
are chiefly used in the rubber and footwear industries and for the manufacture of small home accessories and sports requisites. KRASTEN is a trademark for standard or impact polystyrene. This material is used primarily in electrical engineering and the consumer and food industries. KOPLEN foamed polystyrene is the basic material for the manufacture of shapes, foils, blocks, insulating boards and is widely used in construction. FORSAN is a trademark for the acrylonitrile-butadiene-styrene polymer (ABS) used for the manufacture of interior and exterior fixtures of vehicles. FORSAN can also be used in the consumer and electrical engineering industries.

What strategy do you use to remain competitive on the chemical products market?
We manufacture high-quality goods at competitive prices and rely on excellent technological backing. Our customers include global companies engaged in plastics processing (heat insulation systems, packaging for electronic products and food), and tyre manufacturers.

Which products do you supply to your largest customers?
Our largest customers are mainly interested in purchasing our polystyrene plastics (PS), supplied under the trade names KRASTEN (HIPS and GPPS), KOPLEN – foamed polystyrene and FORSAN – ABS group plastics and styrene-butadiene caoutchoucs manufactured under the trade name KRALEX.

Your company has invested in its production facilities in recent years. Can you specify which concrete investment was made and describe its impact on the company as a whole?
The first step was the launch of operation at the new EPISPOL I epoxy plant in 2005 and at the POLYSPOL polyester and alkyl plant in 2006. Thanks to these new plants we are able to offer our customers products of world standards made using the very latest equipment. The second important step was the launching at the end of 2006 of a modern epichlorhydride plant. Epichlorhydride is the basic material used for epoxy production. Now our epoxy production will no longer be affected by fluctuations on the market of basic materials. This step will also significantly improve the level of our production costs and will help to keep costs in check.

Spolek pro chemickou a hutní výrobu, akciová společnost (SPOLCHEMIE)

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Number of employees: 1090
Contact: Mr Vladislav Plocek, e-mail: plocek@spolchemie.cz
Export: 86 %, for example to Germany, Italy, France, Poland, Belgium, Austria, Great Britain, and Sweden.

SPOLCHEMIE, a.s. (Spolek pro chemickou a hutni výrobu, a.s. – Chemical and Metallurgical Manufacturers Association) celebrated its 150th anniversary in 2006. It is one of the leading chemical manufacturers in the CR, and thanks to its investment in a new epoxy plant, it is also one of Europe’s largest manufacturers of synthetic resins, currently the chief production segment.

Your company has invested in its production facilities in recent years. Can you specify which concrete investment was made and describe its impact on the company as a whole?
The first step was the launch of operation at the new EPISPOL I epoxy plant in 2005 and at the POLYSPOL polyester and alkyl plant in 2006. Thanks to these new plants we are able to offer our customers products of world standards made using the very latest equipment. The second important step was the launching at the end of 2006 of a modern epichlorhydride plant. Epichlorhydride is the basic material used for epoxy production. Now our epoxy production will no longer be affected by fluctuations on the market of basic materials. This step will also significantly improve the level of our production costs and will help to keep costs in check.

Spolek pro chemickou a hutní výrobu, akciová společnost (SPOLCHEMIE)

Revoluční 86, 400 32 Ústí nad Labem, phone: +420 477 161 111, fax: +420 477 163 333, e-mail: info@spolchemie.cz, www.spolchemie.cz

Number of employees: 1090
Contact: Mr Vladislav Plocek, e-mail: plocek@spolchemie.cz
Export: 86 %, for example to Germany, Italy, France, Poland, Belgium, Austria, Great Britain, and Sweden.

SPOLCHEMIE, a.s. (Spolek pro chemickou a hutni výrobu, a.s. – Chemical and Metallurgical Manufacturers Association) celebrated its 150th anniversary in 2006. It is one of the leading chemical manufacturers in the CR, and thanks to its investment in a new epoxy plant, it is also one of Europe’s largest manufacturers of synthetic resins, currently the chief production segment.

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The next step will be to double the existing epoxy production capacity after 2007 by launching a new plant, the EPISPOL II. Our strategy is to strengthen our position on the European epoxy market. Thanks to a boom on the market of composites and electro-applications and the stable demand for applications in construction and in the manufacture of paints, this market also promises a bright future for Spolchemie.

**Have you broadened your production programme recently?**

We responded to current changes in legislation that require companies to limit volatile organic compound emissions by introducing a completely new range of water soluble resins - the CHS-HYDROSOPOL high solid resins. In recent years we have focused on expanding our product range in the epoxy group by including special glues and systems for the production of composites, laminates, and castings for electro-motors and transformers.

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**Pharmaceutical Companies**

**Herbacos – Bofarma, s.r.o.**

Štrossova 239, 530 03 Pardubice, phone: +420 466 614 600, fax: +420 466 614 600, e-mail: hbf@hbf.cz, www.hbf.cz

| Turnover (2005): CZK 292.3 million – approx. EUR 10.4 million |
| Number of employees (2005): 114 |
| Contact: Ms Milena Cvrčková, e-mail: hbf@hbf.cz |
| Exports: for example to Slovakia, Portugal, and Bulgaria |

HERBACOS-BOFARMA, s.r.o. is an important Czech generics pharmaceutical company and promoter of new trends. Its product range is based on a foundation of the latest scientific knowledge as well as respect for traditional experience. Modern technologies are employed in production to ensure the high quality of both new and conventional formulae.

**You are a 100% Czech company. What, in your opinion, is the position of Czech pharmaceutical firms?**

The position of Czech pharmaceutical firms is not simple, which is reflected, among other things, by the fact that HERBACOS-BOFARMA is the only company among the top fifty pharmaceutical companies that is owned exclusively by Czech capital.

**You have also penetrated foreign markets. Where do you maintain your strongest position? Which of your products is in greatest demand abroad?**

As regards foreign markets, our aim is to operate chiefly on the Slovak market. Our most successful products here are mass produced drugs, especially established trademarks, such as Valetol, Acylpyrin, and Veral.

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**AVEFLOR, a.s.**

Budčoves 26, 507 32 Kopidlno, phone: +420 493 551 111, fax: +420 493 551 112, e-mail: aveflor@aveflor.cz, www.aveflor.cz

AVEFLOR, a.s. is a specialist in the production of spray preparations. The company is a manufacturer of cosmetics and veterinary and technical preparations. It offers complete services, ranging from the development of new products and product approval, the purchase of raw and packing materials to production and delivery to the customer. Its
competitive advantage is its "clean" manufacturing environment, which allows it to meet hygienic requirements and manufacture drugs and medicines in sterile form. Great emphasis is placed on the quality of products and services as well as on environmental requirements and work safety.

**What is the company’s philosophy?**

AVEFLOR’s philosophy can be characterised by the principles it follows, such as the satisfaction of customers, satisfaction of employees, and their identification with the company’s vision, mission, and strategy, its positive behaviour in relation to the environment, work safety and health protection, and the spreading of the company’s good name in the region, throughout the CR and in other countries.

**Which new items will appear in your product range in 2007?**

In 2007 we shall introduce a number of new items on the market in two or three basic series. We are broadening our range of hair cosmetics in the Fruit Line, where we plan to launch new shampoos, conditioners, and care cosmetics. In addition, we are launching two new product ranges, AVEmen and AVEwomen.

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Turnover (2005): CZK 60 million – approx. EUR 2 million
Number of employees: 30
Contact: Mr Jiří Zubatý, e-mail: reditel@aveflor.cz
Exports: 50 %, for example to Russia, Germany, Slovakia, Poland, and Lithuania

Aveflor is a specialist in spray preparations
### Exhibitions and Fairs in the Area of Chemistry and Pharmacy in the Czech Republic in 2007

**PRAGOMEDICA**  
29th international medical fair  
17–20 April 2007, Prague Exhibition Grounds  
Incheba Praha spol. s r.o., e-mail: m.benesova@incheba.cz, www.incheba.cz/pragomedica

**HOSPIMedica Brno/Central Europe**  
International fair for medical technology, rehabilitation, and healthcare  
16–19 October 2007, Brno Exhibition Centre  
Veletrhy Brno, a.s., e-mail: vmensikova@bvw.cz, www.bvw.cz/hospimedica

**BIOTECHNICA**  
International trade fair for biotechnology  
9–11 October 2007, Hannover, Germany  
e-mail: info@hf-czechrepublic.com, www.biotechnica.de

**CPhI**  
International chemical and pharmaceutical fair  
1–3 November 2007, London  
Incheba Praha, s.r.o., www.incheba.cz

**MEDICA**  
International fair for medical equipment  
14–17 November 2007, Düsseldorf  
Veletrhy Brno, a.s., www.bvw.cz

## Important Contacts

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<thead>
<tr>
<th>Ministries</th>
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<tr>
<td>Ministry of Health*</td>
<td><a href="http://www.mzcr.cz">www.mzcr.cz</a></td>
<td><a href="mailto:tis@mzcr.cz">tis@mzcr.cz</a></td>
</tr>
<tr>
<td>Ministry of Industry and Trade of the CR</td>
<td><a href="http://www.mpo.cz">www.mpo.cz</a></td>
<td><a href="mailto:mpo@mpo.cz">mpo@mpo.cz</a></td>
</tr>
<tr>
<td>Ministry of the Environment of the CR</td>
<td><a href="http://www.env.cz">www.env.cz</a></td>
<td><a href="mailto:info@env.cz">info@env.cz</a></td>
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<th>Associations and Societies</th>
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<tr>
<td>Association of Chemical Industry of the CR</td>
<td><a href="http://www.schp.cz">www.schp.cz</a></td>
<td><a href="mailto:vladimir.janecek@schp.cz">vladimir.janecek@schp.cz</a></td>
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<tr>
<td>Czech Chemical Society</td>
<td><a href="http://www.csch.cz">www.csch.cz</a></td>
<td><a href="mailto:csch@csch.cz">csch@csch.cz</a></td>
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<tr>
<td>Czech Society of Chemical Engineering</td>
<td><a href="http://www.cschi.cz">www.cschi.cz</a></td>
<td><a href="mailto:csche@cschi.cz">csche@cschi.cz</a></td>
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<tr>
<td>Czech Association of Pharmaceutical Companies</td>
<td><a href="http://www.aff.cz">www.aff.cz</a></td>
<td><a href="mailto:caff@aff.cz">caff@aff.cz</a></td>
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<tr>
<td>Czech Pharmaceutical Society</td>
<td><a href="http://www.cfs-cl.cz">www.cfs-cl.cz</a></td>
<td><a href="mailto:jahodar@faf.cuni.cz">jahodar@faf.cuni.cz</a></td>
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<th>Institutions</th>
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<tr>
<td>State Veterinary Administration of the CR</td>
<td><a href="http://www.svscr.cz">www.svscr.cz</a></td>
<td><a href="mailto:e.podatelna@svscr.cz">e.podatelna@svscr.cz</a></td>
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<tr>
<td>State Institute for Drug Control</td>
<td><a href="http://www.sukl.cz">www.sukl.cz</a></td>
<td><a href="mailto:sukl@sukl.cz">sukl@sukl.cz</a></td>
</tr>
<tr>
<td>National Institute for Nuclear, Chemical, and Biological Protection CR</td>
<td><a href="http://www.sujchbo.cz">www.sujchbo.cz</a></td>
<td><a href="mailto:sujchbo@sujchbo.cz">sujchbo@sujchbo.cz</a></td>
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<th>Universities</th>
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<tr>
<td>Institute of Chemical Technology Prague</td>
<td><a href="http://www.vscht.cz">www.vscht.cz</a></td>
<td><a href="mailto:Ivana.Cerhova@vscht.cz">Ivana.Cerhova@vscht.cz</a></td>
</tr>
<tr>
<td>University of Veterinary and Pharmaceutical Sciences Brno</td>
<td><a href="http://www.vfu.cz">www.vfu.cz</a></td>
<td><a href="mailto:fvl@vfu.cz">fvl@vfu.cz</a></td>
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| Charles University Prague  
Faculty of Pharmacy Hradec Králové | www.faf.cuni.cz | lic@faf.cuni.cz |

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<tr>
<td>Polymer Institute Brno, spol. s r.o.</td>
<td><a href="http://www.polymer.cz">www.polymer.cz</a></td>
<td><a href="mailto:pib@polymer.cz">pib@polymer.cz</a></td>
</tr>
<tr>
<td>Research Institute of Organic Syntheses</td>
<td><a href="http://www.vuos.cz">www.vuos.cz</a></td>
<td><a href="mailto:vuos@vuos.cz">vuos@vuos.cz</a></td>
</tr>
<tr>
<td>Research Centre for Environmental Chemistry and EcoTOXicology (RECETOX)</td>
<td><a href="http://recetox.chemi.muni.cz">http://recetox.chemi.muni.cz</a></td>
<td><a href="mailto:holoubek@recetox.muni.cz">holoubek@recetox.muni.cz</a></td>
</tr>
<tr>
<td>Pharmacon Research</td>
<td><a href="http://www.pharmacon.cz">www.pharmacon.cz</a></td>
<td><a href="mailto:pharmacon@pharmacon.cz">pharmacon@pharmacon.cz</a></td>
</tr>
<tr>
<td>Centre of Epidemiology and Microbiology</td>
<td><a href="http://www.szu.cz/epidemic.htm">www.szu.cz/epidemic.htm</a></td>
<td><a href="mailto:sekretar@szu.cz">sekretar@szu.cz</a></td>
</tr>
<tr>
<td>CEPHA s.r.o. - Centre for Pharmacology and Analysis</td>
<td><a href="http://www.cepha.cz">www.cepha.cz</a></td>
<td><a href="mailto:bazant@cepha.cz">bazant@cepha.cz</a></td>
</tr>
<tr>
<td>BIOPHARM, Research Institute of Biopharmacy and Veterinary Drugs</td>
<td><a href="http://www.bri.cz">www.bri.cz</a></td>
<td><a href="mailto:biopharm@bri.cz">biopharm@bri.cz</a></td>
</tr>
<tr>
<td>Institute of Chemical Process Fundamentals</td>
<td><a href="http://www.icp.fas.cz">www.icp.fas.cz</a></td>
<td><a href="mailto:icecas@icp.fas.cz">icecas@icp.fas.cz</a></td>
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<tr>
<td>Institute of Analytical Chemistry</td>
<td><a href="http://www.iach.cz/iach">www.iach.cz/iach</a></td>
<td><a href="mailto:uach@iach.cz">uach@iach.cz</a></td>
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<tr>
<td>J. Heyrovský Institute of Physical Chemistry</td>
<td><a href="http://www.jh-inst.fas.cz">www.jh-inst.fas.cz</a></td>
<td><a href="mailto:director@jh-inst.fas.cz">director@jh-inst.fas.cz</a></td>
</tr>
<tr>
<td>Institute of Inorganic Chemistry</td>
<td><a href="http://www.iic.fas.cz">www.iic.fas.cz</a></td>
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</tr>
<tr>
<td>Institute of Organic Chemistry and Biochemistry</td>
<td><a href="http://www.oocb.fas.cz">www.oocb.fas.cz</a></td>
<td><a href="mailto:uochb@oocb.fas.cz">uochb@oocb.fas.cz</a></td>
</tr>
<tr>
<td>Institute of Macromolecular Chemistry</td>
<td><a href="http://www.imc.fas.cz">www.imc.fas.cz</a></td>
<td><a href="mailto:office@imc.fas.cz">office@imc.fas.cz</a></td>
</tr>
<tr>
<td>Institute of Experimental Medicine</td>
<td><a href="http://uemweb.biemed.fas.cz">http://uemweb.biemed.fas.cz</a></td>
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<td>Institute of Pharmacology</td>
<td><a href="http://www.fas.cz">www.fas.cz</a></td>
<td><a href="mailto:fku@fas.cz">fku@fas.cz</a></td>
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* Website available only in Czech